Search and Research: The influence of editorial boards on journals' quality

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Abstract

This paper considers the search for the best papers by the editors of an academic journal. Editors' search is sequential. At each period, each editor receives one submission from a researcher and has to decide if she accepts or rejects the paper. The editorial board is heterogeneous, some editors being more demanding than others. On the academic side, researchers choose the quality level of their papers in order to maximize their utility function taking as given the composition of the editorial board. We show that three equilibria may occur. When the number of the less demanding editors is high, or if the editors exhibit great differences in their demand for quality, the journal will attract fewer submissions, publish a small number of papers and these papers will be of low quality. When the editorial board is composed by a homogeneous set of very demanding editors, the journal will publish a high number of high quality papers. For some intermediate structure of the board, a situation of multiple equilibria allows a hybrid equilibrium to exist in which the journal receives both good and bad papers. The long run and welfare implications of these equilibria are analyzed.

Keywords: Editors, Search Equilibrium, Publication market, Academic journals.

JEL Classification: A11; M21; D83

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1. Introduction

What is the impact of the editorial board on the quantity and the quality of the papers published by an academic journal?

Since the beginning of the 90's, a substantial literature has emphasized the role of editors in building a journal's reputation. For example, Stigler *et alii* (1995) put forward that, in steering disciplines according to his tastes, in suppressing or pushing lines of research, editors directly influence the content of their journals. According to Laband (1990) and Bence and Oppenheim (2004), the editorial process contributes to the quality of the journal while referees and editors assist the authors in the production of publishable papers. Donovan (1998) points out that good refereeing and editing raises the perceived quality and increases reader appeal. In their empirical study, Franke *et alii*. (1990) found that an editor who is also an experienced researcher attracts active scholars to submit papers and affects the journals quality by recognizing and selecting papers which will have high impact upon further scholarship.

Moreover, Laband and Piette (1994) show that editors act as real prospectors of good papers. Asking friends or close colleagues to submit and publish their best papers in the journal they act in order to foster its quality. According to Chew et al. (2007), some editors deliberately cultivate links with major institutions or leading researchers with major research projects in order to find the best research and bring it to the journal. This fact is also emphasized by Macdonald and Kam (2007) [see also Medoff, 2003] who claim that editors encourage regular authors who could boost the measured quality of his journal, invite submissions and fast track those who accept their invitation (many submissions being reviewed by editors without going to referees)[4]. In this process, the intrinsic quality of the editors plays a decisive role. As more talented editors can distinguish between good and bad articles with greater precision, as more skilful editors are able to attract better papers, journals with talented editors become high quality journals since they publish good papers more frequently.

[4] Personal contact with editors may decrease the costs of publications. In economics, for instance, publication lags are severe (Yohe 1980, Elisson 2002), however closer contact with editors may reduce the waiting time of a journal's referee reports.

From the researcher point of view, the nature of the editorial committee may also affect submission strategies. Obviously, publishing ethics, the fairness of the selection process or the general governance of the journal could influence the authors' decision making (Thompson 2009). But, more important for the researcher is the permeability of the editing process. If, as McCabe and Snyder (2004) or Besancenot and Vranceanu (2008) assume, editors can only imperfectly determine an article's quality, authors with average quality papers could submit their work to a top journal with some chance of being published while high quality papers could well be rejected.[5] In turn, the quality of the journal deeply relies on the quality of the selection process.

This paper aims at contributing to the analysis of the interaction between editors and researchers and its influence on the academic journals' quality. In order to formalize this interaction, we develop a search equilibrium model in the line of Diamond (1971, 1987) in which the editors of an academic journal are in search for the best papers[6].

Editors' search is sequential: at each period, each editor receives one submission from a researcher and has to decide if she accepts or rejects the paper. The editorial board is heterogeneous, some editors being more demanding than others concerning the minimum quality level of a paper to be published in the journal. On the academic side, researchers choose the optimal level of their papers' quality in order to maximize their utility function taking as given the structure of the editorial board.

We show that according to the structure of the board, three equilibria may occur. When the number of the less demanding editors is high, or if the editors exhibit a high difference in their degree of demand, the journal will attract fewer submissions, publish a small number of papers and these papers will present a low quality. Alternatively, when the editorial board is composed by a homogeneous set of very demanding editors, the journal will publish a higher number of high quality articles. For some intermediate structure of the board, a situation of multiple equilibria allows a hybrid equilibrium to exist in which the journal receives both good and bad papers.

In the long run, under free entry assumption, new researchers consider the possibility of submitting their work to the journal. Two results are worth mentioning. First, the welfare of both the editors and the researchers is proven to be higher in the high quality equilibrium. Building a very demanding editorial board is socially efficient for an academic journal. Second, the long run dynamics of the potential authors' population could be detrimental to some high quality journals. As new researchers are attracted by a publication in a good journal, the room left for each author in the journal drops and researchers' utility decreases. In some case, this could make the authors' choice for high quality suboptimal and challenge the reputation of the journal's quality.

One restrictive assumption of the model is that editors have perfect information about the quality of the submitted papers. One consequence of this assumption is to restrict the number of submitted papers.

[5]The rejection of famous papers has been documented by Ganz and Shepherd (1994). More recently, Oswald (2007) shows that highly cited papers are not always published by top journals.

[6] Previous modeling strategy involves differential games as in Faria (2005) and Goel (2006).

In this case, indeed, low quality papers will be rejected with certainty by very demanding editors. Thus, a journal with very demanding board will only receive high quality papers, each of them being published by the journal. This assumption thus forbids any possibility of journals' congestion (Goel and Faria 2007) and is inconsistent with the observed increase of the rejection rate of top journals. Relaxing this assumption would allow the building of a more realistic model but is beyond the scope of this paper.

The paper is organized as follows. Section 2 introduces main assumptions and then analyzes editors' optimal decision rules and the quality-setting strategy of the researchers. Section 3 presents the typology of equilibria and their basic features. A last section summarizes our conclusions.

2. The model

We consider an academic journal searching for papers to publish. The editorial board of the journal is composed by a continuum of editors. The exogenous measure of these editors is normalized to unity. The potential contributors to the journal are made of a continuum of researchers, the endogenous measure of which is equal to n . Researchers are uniformly distributed among editors at each time period.

Let us denote by $m = 1/n$ the (small) measure of editors per researcher. At each period, each researcher writes m papers, meets m editors, and submits one paper to each of them.

Editors' search for the best paper is sequential. At each period, they receive one single paper. If the paper is accepted, the editor leaves the market and is replaced by another editor with the same characteristics during the next period. If the paper is rejected, the editor keeps searching for a good paper to publish. Researchers write their paper before meeting their editors and submissions are set according to a take-it or leave-it procedure.

New researchers are free to enter this publication market and do so as long as their expected utilities are positive.

Editors' utility

Let us assume that the indirect utility function of the representative editor is:

$$U(t,q) = \beta^t(q - \bar{Q}^i),$$

where q is the quality level of the paper, $\beta \in \ ]0,1[$ is the psychological discount rate and t is the period at which the paper is published. According to the previous equation, $\bar{Q}^i$ is the lower level of paper quality that editor i would accept to publish. By analogy with the standard search theory, hereafter we will refer to this threshold as the "willingness to publish".

The editors' search process

The set of papers' quality written by academics is S (a subset of $\mathbb{R}^+$). Let us denote by $\mathbb{F}$ the probability measure of papers' qualities. The search process is sequential. During each period an editor receives exactly one submission. An editor who receives a paper with quality q may either accept it and leave the market, or turn it down and keep searching for a better paper.

The discounted expected utility of editor i who has a paper of quality q in hand is denoted by $V^i(q)$ and obeys the following Bellman equation:

$$V^i(q) = \max\{q - \overline{Q}^i,\ \beta \int V^i\, d\mathbb{F}\},\quad \forall q \in S, \tag{1}$$

where $V^i(\cdot)$ is defined on S.

The editor can either publish the paper (in this case his instantaneous utility is $(q - \bar{Q}^i)$), or keep searching for at least one more period (in this case his expected utility is $\beta \int V^i\, d\mathbb{F})$. According to Eq. (1), the rational editor chooses the better of the two alternatives.

Given that the second term in brackets of Eq. (1) is constant, and that the first term increases in q, the editor optimal strategy consists in selecting a reservation quality q_r^i and accepting all offers above this reservation quality. The value function $V^i(\cdot)$ respects the following expression:

$$V^i(q) = \begin{cases} q - \overline{Q}^i \text{ if } q \geq q_r^i \\ \beta \int V^i d\mathbb{F} \text{ if } q < q_r^i \end{cases} \tag{2}$$

An editor receiving a paper the quality of which is q_r^i is indifferent between taking this offer or continuing to search. Thus, the reservation quality of the editor i is implicitly defined by:

$$q_r^i - \overline{Q}^i = \beta \int V^i d\mathbb{F}, \tag{3}$$

Let us suppose that S is continuous and that $\mathbb{F}$ admits a density function. We denote $F(\cdot)$ the cumulative distribution derived from $\mathbb{F}$. After some calculations, Eq. (3) may be rewritten as:

$$\begin{aligned} q_r^i - \overline{Q}^i &= \beta\left\{\int_{\{q<q_r^i\}} \left(\beta \int V^i dF(\cdot)\right) dF(q) + \int_{\{q \geq q_r^i\}} (q - \overline{Q}^i) dF(q)\right\} \\ &= \beta\left\{\int_{\{q<q_r^i\}} \left(q_r^i - \overline{Q}^i\right) dF(q) + \int_{\{q \geq q_r^i\}} (q - q_r^i + q_r^i - \overline{Q}^i) dF(q)\right\} \\ &= \beta\left\{\left(q_r^i - \overline{Q}^i\right) + \int_{\{q \geq q_r^i\}} (q - q_r^i) dF(q)\right\} \end{aligned} \tag{4}$$

In this form, the integral $\int V^i d\mathbb{F}$, indicating the expected gain from an additional search, is written as the sum of the utility of an editor who accepts a paper with the reservation quality q_r^i and an expected bonus from successful search activity. The presence of a discount factor ($\beta)$ explains why for the optimal reservation quality the individual is indifferent between accepting the paper or continuing to search.

Differentiating Eq. (4) allows us to infer an important relationship between the willingness to publish $\bar{Q}^i$ and the paper's reservation quality level q_r^i:

$$\frac{\partial q_r^i}{\partial \bar{Q}^i} = \frac{1-\beta}{1-\beta F(q_r^i)} > 0. \tag{5}$$

The reservation quality level q_r^i is an increasing function in the editor's willingness to publish. This result also holds when S is a discrete set.

In order to simplify the analysis, it is assumed that only two types of editors exist: a fraction $(1-p)$ of the editors' population is made of $L-$ Editors characterized by a willingness to publish $\bar{Q}^L$; a fraction p of the editors population is made of $H-$ Editors characterized by a willingness to publish $\bar{Q}^H$. With $\bar{Q}^L < \bar{Q}^H$, the $L-$ editors are less demanding than the $H-$ Editors. In keeping with the result of Eq. (5), let us denote by $q_r^{\inf}$ the reservation quality of the $L-$ Editors and by $q_r^{\sup}$ the reservation quality of the $H-$ Editors. The reservation qualities respect $q_r^L < q_r^H$, so $L-$ editors may accept papers that would be rejected by the $H-$ Editors.

In this case the probability measure $\mathbb{G}$ of the reservation level of papers' quality is:

$$\mathbb{G} = p\delta_{\{q_r^{\sup}\}} + (1-p)\delta_{\{q_r^{\inf}\}}. \tag{6}$$

where $\delta_{\{x\}}$ indicates the Dirac measure at point x . Let denote G the cumulative distribution inferred from $\mathbb{G}$.

Researchers' utility

Researchers are utility-maximizers. Writing their papers, each academic chooses its optimal level of quality, taking as given the level of his competitors' papers' quality.

The researchers' expected utility for a researcher producing papers of quality q is $U(q^i)$ with:

$$U(q^i) = -cq^i + m\bar{q}\left[p1_{\{q \geq q_r^{\sup}\}} + (1-p)1_{\{q \geq q_r^{\inf}\}}\right] \tag{7}$$

Researchers incur a writing cost cq^i to participate in the publication game. This cost is indexed on the quality level of papers written by the researcher. Utility is increasing with the number of publications and with the mean quality $\bar{q}$ of the papers published by the journal[7]. According to the distribution of the editors type, the number of publication is nil if $q < q_r^{\inf}$, is equal to $(1-p)m$ if $q_r^{\inf} \leq q < q_r^{\sup}$ and is equal to m if $q \geq q_r^{\sup}$. Obviously, a rational researcher would never write papers with a quality level such as $q < q_r^{\inf}$ as it would imply a negative utility. A researcher which aims at publishing m papers will choose a quality in the range $q \geq q_r^{\sup}$; in this case, the optimal quality is $q_r^{\sup}$. Finally, a researcher which plans to publish $(1-p)m$ papers must choose a quality in the range $q_r^{\inf} \leq q < q_r^{\sup}$; the optimal quality is $q_r^{\inf}$.

Denote by $s \in \,]0,1[$ the share of researchers choosing quality $q_r^{\inf}$. The papers' quality distribution is then given by:

$$\mathbb{F} = s\delta_{\{q_r^{\inf}\}} + (1-s)\delta_{\{q_r^{\sup}\}}. \tag{8}$$

The two extreme cases $s = 0$ and $s = 1$ imply a degenerated quality distribution.

According to these optimal strategies, $H-$ editors will only accept to publish the high quality $(q_r^{\sup})$ papers and $L-$ editors will publish both $q_r^{\inf}$ and $q_r^{\sup}$ papers. Let $\bar{q}$ denote the mean quality of the papers published by the journal, one published paper increases the utility of its author by an amount $\bar{q}$, with:

$$\bar{q} = \frac{sq_r^{\inf}(1-p) + (1-s)q_r^{\sup}}{s(1-p) + (1-s)} \tag{9}$$

Reservation quality levels

Let us first consider the decision of the most demanding editors. With the $\bar{Q}^H$ willingness to publish, according to Eq. (5), they choose the high reservation level of papers' quality ($q_r^{\sup}$). Eq. (3) becomes:

[7] For a researcher, the value of a publication is connected to the quality of the journal in which the paper is published (measured by its impact factor or by its reputation) and not to the intrinsic paper's quality.

$$\begin{aligned} q_r^{\sup} - \overline{Q}^H &= \beta \int V^i d\mathbb{F} \\ &= \beta\left\{sV^H\left(q_r^{\inf}\right) + (1-s)V^H\left(q_r^{\sup}\right)\right\} \\ &= \beta\left\{s\beta\int V^i d\mathbb{F} + (1-s)V^H\left(q_r^{\sup}\right)\right\} \\ &= \beta\left\{s\left(q_r^{\sup} - \overline{Q}^H\right) + (1-s)\left(q_r^{\sup} - \overline{Q}^H\right)\right\} \\ &= \beta\left(q_r^{\sup} - \overline{Q}^H\right) \end{aligned} \tag{10}$$

Eq. (10) can be solved for the reservation level of quality:

$$q_r^{\sup} = \overline{Q}^H. \tag{11}$$

This implies that the equilibrium utility of the $H-$ editors is nil.

For the less demanding editors (with the $\bar{Q}^L$ willingness to publish), the reservation quality $q_r^{\inf}$ is implicitly defined by:

$$\begin{aligned} q_r^{\inf} - \overline{Q}^L &= \beta \int V^i d\mathbb{F} \\ &= \beta\left\{sV^L\left(q_r^{\inf}\right) + (1-s)V^L\left(q_r^{\sup}\right)\right\} \\ &= \beta\left\{s\left(q_r^{\inf} - \overline{Q}^L\right) + (1-s)\left(q_r^{\sup} - \overline{Q}^L\right)\right\}. \end{aligned} \tag{12}$$

The optimal low reservation level of quality is thus :

$$\begin{aligned} q_r^{\inf} - \overline{Q}^L &= \beta\left\{s\left(q_r^{\inf} - \overline{Q}^L\right) + (1-s)\left(q_r^{\sup} - \overline{Q}^L\right)\right\} \\ \left(q_r^{\inf} - \overline{Q}^L\right)(1-\beta s) &= \beta(1-s)\left(q_r^{\sup} - \overline{Q}^L\right) \\ q_r^{\inf} &= \overline{Q}^L + \frac{\beta(1-s)\left(\overline{Q}^H - \overline{Q}^L\right)}{(1-\beta s)} \\ q_r^{\inf} &= \frac{(1-\beta s)\overline{Q}^L + \beta(1-s)\left(\overline{Q}^H - \overline{Q}^L\right)}{(1-\beta s)} \\ q_r^{\inf} &= \frac{(1-\beta)\overline{Q}^L + \beta(1-s)\overline{Q}^H}{(1-\beta s)}. \end{aligned} \tag{13}$$

In a more tractable form, $q_r^{\inf}$ can be rewritten as:

$$q_r^{\inf} = \alpha\overline{Q}^L + (1-\alpha)\overline{Q}^H, \text{ with } \alpha = \frac{1-\beta}{1-\beta s}. \tag{14}$$

Since α is an increasing function of s, $q_r^{\inf}$ is decreasing with s. More researchers writing low quality papers implies less demanding *L*-editors.

3. Typology of equilibria

An equilibrium is a situation in which each researcher chooses an optimal quality level for his scientific production and each editor chooses an optimal publication rule (summarized by his reservation quality level), the two strategies being mutually consistent. For a given p (the fraction of H-Editors), three types of equilibria may occur depending on the relative gap between the high and the low willingness to publish. Two of them are degenerate, $s = 0$ and $s = 1$, and the last one involves mixed strategies $s \in [0,1]$.

- $s = 1$ *: all researchers choose* $q_r^{\inf}$

According to Eq. (7) the utility of each researcher is:

$$U^{s=1}(q_r^{\inf}) = -cq_r^{\inf} + mq_r^{\inf}(1-p). \tag{15}$$

If a researcher deviates from this strategy and chooses quality $q_r^{\sup}$, his paper will be accepted. Since this researcher is "small" compared to the continuum of researchers, the mean quality $\bar{q}$ of the papers published by the journal will not be affected, so the researcher's utility will be:

$$U^{s=1}(q_r^{\sup}) = -cq_r^{\sup} + mq_r^{\inf}, \tag{16}$$

where $q_r^{\inf} = \bar{Q}^L$ (Cf. Eq. 14).

The situation in which all researchers choose the quality $q_r^{\inf}$ is a Nash equilibrium if and only if $U^{s=1}(q_r^{\sup}) \leq U^{s=1}(q_r^{\inf})$, i.e. no researcher can gain from an unilateral deviation (i.e. by choosing a high quality level for his papers):

$$\begin{aligned} -cq_r^{\sup} + mq_r^{\inf} &\leq -cq_r^{\inf} + mq_r^{\inf}(1-p) \\ -c\overline{Q}^H &\leq -cq_r^{\inf} - pmq_r^{\inf} \\ c\overline{Q}^H &\geq (c+pm)\overline{Q}^L \\ \frac{c}{m}\left(\frac{\overline{Q}^H}{\overline{Q}^L} - 1\right) &\geq p \end{aligned} \tag{17}$$

According to condition (17), researchers decide to write low quality papers and to publish the smaller quantity (that is $m(1-p)$) when the measure of researchers $n = 1/m$ is "high", when the gap between the high and the low willingness to publish is high or when the proportion p of the H-editors is low. In this equilibrium, no researcher would write a high quality paper because the limited positive effect on the number of publications does not compensate for the increase in the writing cost.

According to Eq. (15), in this equilibrium the utility of each researcher is:

$$U^{s=1}(q_r^{\inf}) = \left(-c + m(1-p)\right)\overline{Q}^{L}, \tag{18}$$

Utility per researcher is an increasing function in the measure m of editors per researcher, or, given that $m = 1/n$, a decreasing function in the measure of researchers n. By assumption, researchers are free to enter this market for publication as long as they obtain a positive utility. When $U^{s=1}(q_r^{\inf}) > 0$ new researchers are attracted by the journal and submit new papers, thus there is a drop in the number m of editors available to each researcher. Hence, with free entry, utility decreases and must be nil in the long run equilibrium: $U^{s=1}(q_r^{\inf}) = 0$. Replacing m by $1/n$ in Eq. (18), then equating utility to zero, we get Eq. (19) which defines the long run measure of researchers in the economy:

$$n = \frac{(1-p)}{c}, \tag{19}$$

Remark that, in the long run, the number of published papers is equal to $(1-p)$. Finally, the condition for this equilibrium to exist in the long run is given by:

$$\left(1 - \frac{\overline{Q}^{L}}{\overline{Q}^{H}}\right) \geq p. \tag{20}$$

This equilibrium exists if the proportion p of the *H* editors is "small" compared to the relative gap between the willingnesses to publish. The more important this gap is, the easier the condition is satisfied. However, as the long run value of m is smaller than the short run one, this condition is less binding than the short run one.

Let us now consider the welfare dimension of this equilibrium. From a utilitarian point of view, the welfare W is given by the sum of the editors and the researchers' utilities. In the long run, because of the free entry assumption, researchers' utility is null. Editors' utility is also null since, with a general level of papers' quality equal to $\bar{Q}^L$, editors with the low willingness to publish will reap a null utility while the editors with the $\bar{Q}^H$ willingness to publish, always postponing their acceptation of a paper, will reach a 0 level of utility. Thus, in this equilibrium, welfare is nil, $W = 0$.

- $s = 0$: *all researchers choose* $q_r^{\sup}$

Given Eq. (11) the reservation quality of the *H*-editors is:

$$q_r^{\sup} = \overline{Q}^{H}. \tag{21}$$

The utility of each researcher is then:

$$U^{s=0}(q_r^{\sup}) = (-c+m)\overline{Q}^H \tag{22}$$

If a researcher deviates from this strategy and chooses $q_r^{\inf}$, (i.e. the reservation quality level of the L-editors), his utility becomes:

$$U^{s=0}(q_r^{\inf}) = -cq^{\inf} + m\overline{Q}^H(1-p) \tag{23}$$

The equilibrium where all researchers choose quality $q_r^{\sup}$ is individually rational if and only if $U^{s=0}(q_r^{\sup}) \geq U^{s=0}(q_r^{\inf})$, that is:

$$(-c+m)\overline{Q}^H \geq -cq^{\inf} + m\overline{Q}^H(1-p)$$

$$-c\overline{Q}^H \geq -cq^{\inf} - pm\overline{Q}^H$$

$$-c\overline{Q}^H \geq -c\left((1-\beta)\overline{Q}^L + \beta\overline{Q}^H\right) - pm\overline{Q}^H$$

$$\frac{c\overline{Q}^H - c\left((1-\beta)\overline{Q}^L + \beta\overline{Q}^H\right)}{m\overline{Q}^H} \leq p$$

$$(1-\beta)\frac{c}{m}\left(1-\frac{\overline{Q}^L}{\overline{Q}^H}\right) \leq p \tag{24}$$

According to (24), researchers choose the high reservation quality and publish the maximum quantity m of papers if the measure of researchers $n = 1/m$ is "low", when the gap between the high and the low willingnesses is low or when the proportion p of the H-editors is high. In this equilibrium, the papers' quality level and the number of published papers are both higher than in the previous one.

In the long run, under the free entry condition, researchers' utilities are driven to zero: $U^{s=0}(p_r^{\sup}) = 0$. Setting utilities defined by Eq. (22) to zero we obtain Eq. (25) which defines the long run measure of researchers:

$$n = \frac{1}{c}. \tag{25}$$

In this equilibrium, as in the previous one, as long as $U^{s=0}(q_r^{\sup}) > 0$ the measure of the researchers interested by the journal increases. New researchers submit papers (m decreases) and the utilities decrease. In the long run, the number of published papers is equal to one: at each period, each editor finds an interesting paper to publish. Remark that the welfare W is now positive. As $q_r^{\sup} = \bar{Q}^H$, each researcher writes top quality paper and, whatever the editor's type, the paper will be accepted. The H-editors will record a null utility level but the L-editors record a positive utility. We get: $W = (1-p)(\bar{Q}^H - \bar{Q}^L) > 0$. In this equilibrium, the papers' quality level, the number of published papers, the measure of researchers and the global welfare are higher than in the previous one with $s = 1$.

Finally, the existence condition for this equilibrium in the long run is given by:

$$\left(1-\beta\right)\left(1-\frac{\overline{Q}^{L}}{\overline{Q}^{H}}\right)\leq p, \tag{26}$$

One interesting result here is that the existence condition is more binding in the long run than in the short run. For a p in the range $[(1-\beta)\frac{c}{m}\left(1-\frac{\bar{Q}^{L}}{\bar{Q}^{H}}\right),(1-\beta)\left(1-\frac{\bar{Q}^{L}}{\bar{Q}^{H}}\right)],$ the long run increase of the measure of researchers implies that condition (24), true in the short run, will not be satisfied in the long run and the journal will switch from the high ($s=0)$ to the low equilibrium ($s=1$). In this case, the journal's quality level will suddenly and dramatically drop. For p in this range, the good status of the academic journal is only guaranteed in the short run.

- $0<s<1$: *the mixed strategy.*

For some values of the parameters, the equilibrium $s=0$ and the equilibrium $s=1$ coexist and a third equilibrium is also possible, where a fraction $0<s<1$ of researchers adopt quality $q_r^{\inf}$ while the others adopt $q_r^{\sup}$. More precisely, this will be the case when the following inequality is verified (see fig. 1),

$$\left(1-\beta\right)\frac{c}{m}\left(1-\frac{\overline{Q}^{L}}{\overline{Q}^{H}}\right)\leq p\leq\frac{c}{m}\left(\frac{\overline{Q}^{H}}{\overline{Q}^{L}}-1\right). \tag{27}$$

In this equilibrium, the utility of a researcher choosing $q_r^{\inf}$ is:

$$U^{s\in(0,1)}(q_r^{\inf})=-cq_r^{\inf}+m\overline{q}(1-p), \tag{28}$$

and the utility of a researcher choosing $q_r^{\sup}$ is:

$$U^{s\in(0,1)}(q_r^{\sup})=-cq_r^{\sup}+m\overline{q}. \tag{29}$$

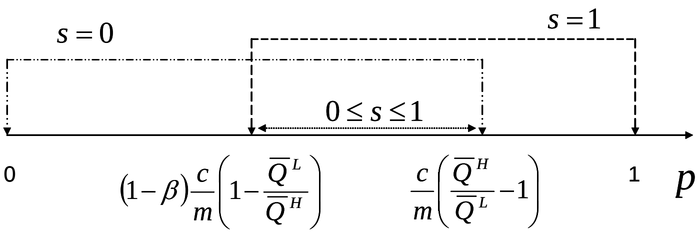

Figure 1

In this mixed strategy configuration, the average quality of published papers is:

$$\begin{aligned}\overline{q} &= \frac{sq_r^{\inf}(1-p)+(1-s)q_r^{\sup}}{s(1-p)+(1-s)} \\ &= q_r^{\sup} - x\left(q_r^{\sup}-q_r^{\inf}\right) \text{ with } x = \frac{s(1-p)}{s(1-p)+(1-s)}\end{aligned} \tag{30}$$

Recall that $q_r^{\inf}$ is decreasing with s. As x is an increasing function of s, the mean quality $\bar{q}$ of the papers published by the journal is increasing with s. When a higher fraction of the researchers adopts the low quality level, $q_r^{\inf}$, the mean quality of the published papers decreases. Replacing (14) in (30), we finally get:

$$\begin{aligned}\overline{q} &= \overline{Q}^H - x\left(\overline{Q}^H - \alpha\overline{Q}^L - (1-\alpha)\overline{Q}^H\right) \\ &= \overline{Q}^H - x\alpha\left(\overline{Q}^H - \overline{Q}^L\right), \text{ with } \alpha = \frac{1-\beta}{1-\beta s}\end{aligned} \tag{31}$$

In this equilibrium, the utility of a researcher must be the same whatever its strategy. Therefore s is defined as the implicit solution of the following equation:

$$\begin{aligned}&U(q_r^{\sup}) = -cq_r^{\sup} + m\overline{q} = -cq_r^{\inf} + m\overline{q}(1-p) = U^{s\in(0,1)}(q_r^{\inf}) \\ &\Leftrightarrow cq_r^{\sup} = cq_r^{\inf} + pm\overline{q} \\ &\Leftrightarrow c\overline{Q}^H = c\left(\alpha\overline{Q}^L + (1-\alpha)\overline{Q}^H\right) + pm\left(\overline{Q}^H - x\alpha\left(\overline{Q}^H - \overline{Q}^L\right)\right) \\ &\Leftrightarrow 0 = c\alpha\left(\overline{Q}^L - \overline{Q}^H\right) + pm\left(\overline{Q}^H - x\alpha\left(\overline{Q}^H - \overline{Q}^L\right)\right)\end{aligned} \tag{32}$$

By differentiation, it can be checked that $\frac{ds}{dp} > 0$ and that s varies between 0 and 1 when p evolves between $(1-\beta)\frac{c}{m}\left(1-\frac{\bar{Q}^L}{\bar{Q}^H}\right)$ and $\frac{c}{m}\left(\frac{\bar{Q}^H}{\bar{Q}^L}-1\right)$. As researchers match only a fraction $1-p(1-s)$ of the total publication opportunities, the level of publications in the mixed strategy case is higher than in the case $s=0$ but lower than in the case $s=1$;

Let us now consider the long run properties of this equilibrium. Under the free entry condition, $U^{s\in[0,1]}(q_r^{\sup}) = U^{s\in[0,1]}(q_r^{\inf}) = 0,$ thus:

$$U^{s\in[0,1]}(q_r^{\sup}) = -cq_r^{\sup} + m\overline{q} = 0 \Leftrightarrow n = \frac{\overline{q}}{c\overline{Q}^H}$$

$$U^{s\in(0,1)}(q_r^{\inf}) = -cq_r^{\inf} + m\overline{q}(1-p) = 0 \Leftrightarrow n = \frac{\overline{q}(1-p)}{cq_r^{\inf}} \tag{33}$$

Therefore, given the average quality of published papers (Cf. Eq. 31), these two equations give two different definitions of the long run measure of the researchers:

$$n = \frac{1}{c}\left(1 - x\alpha\frac{\left(\overline{Q}^H - \overline{Q}^L\right)}{\overline{Q}^H}\right) < \frac{1}{c}$$

$$n = (1-p)\frac{1}{c}\frac{\overline{Q}^H - x\alpha\left(\overline{Q}^H - \overline{Q}^L\right)}{\overline{Q}^H - \alpha(\overline{Q}^H - \overline{Q}^L)} > (1-p)\frac{1}{c} \tag{34}$$

As expected, the measure of researchers in the mixed-strategy equilibrium is now between the measures of researchers in the two pure configurations. Equalizing those two equations finally leads to an explicit solution for s :

$$\left(\frac{\overline{Q}^H - x\alpha\left(\overline{Q}^H - \overline{Q}^L\right)}{\overline{Q}^H}\right) = (1-p)\frac{\overline{Q}^H - x\alpha\left(\overline{Q}^H - \overline{Q}^L\right)}{\overline{Q}^H - \alpha(\overline{Q}^H - \overline{Q}^L)}$$

$$\left(\frac{1}{\overline{Q}^H}\right) = (1-p)\frac{1}{\overline{Q}^H - \alpha(\overline{Q}^H - \overline{Q}^L)}$$

$$\overline{Q}^H - \alpha(\overline{Q}^H - \overline{Q}^L) = (1-p)\overline{Q}^H$$

$$\alpha\frac{(\overline{Q}^H - \overline{Q}^L)}{\overline{Q}^H} = p$$

$$s = \frac{1}{\beta}\left[1 - (1-\beta)\frac{(\overline{Q}^H - \overline{Q}^L)}{p\overline{Q}^H}\right] \tag{35}$$

It can be checked that s varies between 0 and 1 when p evolves between $(1-\beta)\left(1 - \frac{\bar{Q}^L}{\bar{Q}^H}\right)$ and $\left(1 - \frac{\bar{Q}^L}{\bar{Q}^H}\right)$. In this last equilibrium, the welfare is given by:

$$W = (1-s)(1-p)(\bar{Q}^H - \bar{Q}^L) + s\left(q_r^{\inf} - \bar{Q}^L\right).$$

Obviously, this value is defined in the range $[0,\ (1-p)(\bar{Q}^H - \bar{Q}^L)]$ bounded by the welfare values of the cases $s = 0$ and $s = 1$.

4. Concluding remarks

This paper studies the influence of the editorial board of an academic journal on the quality and the quantity of published papers. It shows that when editors exhibit strong differences in their demand for papers' quality, then a low equilibrium could occur: the journal publishes only few papers of low quality and, in the long run, this equilibrium comes along with a null welfare for both editors and researchers. When the editorial board is homogeneous, holding the same ideas about the quality level that must be required before publication, the equilibrium status of the journal is higher: the journal receives and publishes numerous high quality papers.

More specifically, when the editorial board is composed by a majority of demanding editors, authors have an incentive to write and submit good papers. Indeed, the publication probability of a good paper is one and the mean quality of the journal is high. Thus, submitting a paper for publication in such a journal is worth trying even when writing good papers is more costly. In the opposite case, when editors seem to accept papers of any quality level, the mean quality of the journal will be low and its attractivity will be lower for the best researchers. Publishing a good paper in a bad journal is worthless (or even costly) and submitted papers in such a journal will only be of low quality.

It can be noticed that, whatever the equilibrium, the number of researchers will increase with time. However, in the high equilibrium, researchers having chosen to write top quality papers may see their interest in continuing on this way vanishing. In this case, the status of the journal may switch from a top level in the short run to a low level in the long run. Alternatively , if researchers have chosen to write low quality papers, the increase in their number as potential contributors to the journal may make their choice more profitable than the high quality choice and the poor status of the journal is self enforcing.

Our model shows that editors' homogeneity is a necessary condition for the journal's quality. Editors having common features, such as a common background, working in the same or similar institutions, being members of the same schools of though, may share a common idea of what should be a publishable paper[8]. Selecting editors from a pool with common characteristics could be efficient for an academic journal looking for high standards of publication.

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